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EXAMINER	
BOYER, RANDY	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/711,176	IQBAL ET AL.	
	Examiner	Art Unit	
	Randy Boyer	1764	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 April 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-44* is/are pending in the application.

4a) Of the above claim(s) *18-26 and 38-44* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17 and 27-37* is/are rejected.

7)☒ Claim(s) *31* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *30 August 2004*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:

   I. Claims 1-17 and 27-37, drawn to a process and apparatus for upgrading crude oil from a subterranean reservoir of heavy oil or bitumen, classified in class 208, subclass 113.

   II. Claims 18-26, drawn to a process for upgrading crude oil from a subterranean reservoir of heavy oil or bitumen, the process including a step of hydrotreating a hydrocarbon effluent to produce a low sulfur hydrocarbon effluent, classified in class 208, subclass 209.

   III. Claims 38-44, drawn to an apparatus for producing and upgrading crude oil from a subterranean reservoir of heavy oil or bitumen, classified in class 422, subclass 144.

2. Inventions II and III are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another and materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case, the process of invention II can be practiced by another and materially different apparatus, e.g. one not having a "means for injecting steam through one or more injection wells completed in communication with the reservoir to mobilize

heavy oil or bitumen," or a "means for producing the mobilized heavy oil or bitumen from at least one production well completed in communication with [a] reservoir."

3. Inventions II and III are unrelated from invention I. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different designs, modes of operation, and effects (MPEP § 802.01 and § 806.06). In the instant case, inventions II and III are drawn to a process and apparatus to produce a low sulfur hydrocarbon effluent. Invention I, on the other hand, is drawn to a process and apparatus to produce a hydrocarbon effluent having a reduced metal content. In this respect, invention I is different in design, operation, and effect from either of inventions II or III because invention I (as presently claimed in independent claims 1, 5, and 27) does not provide a process step or means for producing a hydrocarbon effluent having a reduced sulfur content.

4. Because these inventions are independent or distinct for the reasons given above and there would be a serious burden on the examiner if restriction is not required because the inventions have acquired a separate status in the art in view of their different classification, restriction for examination purposes as indicated is proper.

5. During a telephone conversation with Christian Heausler, attorney for Applicant, on May 22, 2007 a provisional election was made without traverse to prosecute the invention of Group I, claims 1-17 and 27-37. Affirmation of this election must be made by applicant in replying to this Office action. Claims 18-26 and 38-44 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Claim Objections

6. Claim 31 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

7. With respect to claim 31, the claim as presently submitted reads "The apparatus of claim 27 wherein the solvent deasphalting means comprises a high lift." Examiner understands the term "lift" to be synonymous with "DAO yield" as it is commonly used in the art. Consequently, "high lift" refers to "high DAO yield" which is a characteristic of a deasphalting *process* and not a "deasphalting means" (i.e. apparatus). In such case, claim 31 is improperly dependent on claim 27 because the limitation "high lift" does not further limit the *apparatus* of claim 27.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

11. Claims 1-8, 10-16, and 27-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Audeh (US 5192421) in view of Inomata (JP 2002-302680).

12. With respect to claim 1, Audeh discloses a process for upgrading crude oil from a subterranean reservoir of heavy oil or bitumen, comprising: (a) solvent deasphalting at least a portion of the heavy oil or bitumen to form an asphaltene fraction and a deasphalted oil (DAO) fraction essentially free of asphaltenes having a reduced metals content (see Audeh, column 9, lines 15-38); (b) supplying a feed comprising the DAO fraction to an upgrading means (see Audeh, column 5, lines 42-63); and (c) recovering an upgraded product (see Audeh, column 5, lines 55-59).

Audeh does not disclose wherein the upgrading means involves depositing a

portion of the metals from the DAO fraction onto an FCC catalyst, and recovering a hydrocarbon effluent having a reduced metal content from an FCC unit.

However, Audeh discloses that his process can be used to produce a FCC feed (see Audeh, column 4, lines 32-35), and that the upgrading means may be catalytic cracking, hydrotreating, or hydrocracking (see Audeh, column 5, lines 59-61). In addition, Inomata discloses a process for the solvent extraction and hydrorefining of heavy oil (see Inomata (English translation), Abstract). In the first stage of Inomata's process, asphalthenic components are selectively removed from a heavy oil feed by solvent extraction (see Inomata (English translation) at page 6, lines 20-24). Next, the deasphalted oil is recovered and subjected to hydrorefining, which Inomata describes as encompassing both hydrocracking and hydrodemtallization (see Inomata (English translation) at page 7, lines 21-29). Elaborating on the process of hydrodemetallization, Inamato explains that metallic compounds in the hydrocarbon are hydrolyzed at high temperatures and pressures in the presence of hydrogen wherein the elemental metal contaminants are precipitated onto the catalyst to obtain a refined oil having a low metal concentration (see Inomata (English translation) at page 7, lines 32-34). Inomata further discloses that two are more catalyst types can be used together in the hydrorefining stage, such that it is possible to carry out hydrocracking and hydrodemetallization in the same unit (see Inomata (English translation) at page 7, lines 44-48).

Therefore, the person having ordinary skill in the art of heavy oil upgrading would

have been motivated to incorporate the use of Inomata's hydrorefining process as the "upgrading means" of Audeh's process in order to deposit a portion of the metals from the DAO fraction onto an FCC catalyst, and recover a hydrocarbon effluent having a reduced metal content from an FCC unit.

Finally, the person having ordinary skill in the art of heavy oil upgrading would have had a reasonable expectation of success in incorporating the use of Inomata's hydrorefining process as the upgrading means of Audeh's process because (1) both Audeh and Inomata are directed to the solvent deasphalting of heavy oil, and (2) Audeh specifically contemplates the use of hydrocracking and hydrotreating as the "upgrading means" in a process for upgrading crude oils.

13. With respect to claim 2, Audeh discloses converting the asphaltenes to steam for use in producing heavy oil or bitumen from the reservoir for feed to the solvent deasphalting (see Audeh, column 5, lines 64-68; and column 6, lines 1-3).

14. With respect to claim 3, Audeh discloses supplying the asphaltene fraction from the solvent deasphalting to the asphaltenes conversion (see Audeh, column 5, lines 35-37 and 64-66; and drawing).

15. With respect to claim 4, Examiner notes that neither Audeh nor Inomata expressly disclose removing metallized FCC catalyst from the FCC unit. However, Inomata explains that the hydrorefining process is a "representative refining process," and that metal contaminants contained within the DAO precipitate out onto the catalysts used during hydrodemetallization. Thus, the person having ordinary skill in the art of heavy oil upgrading and FCC processes would recognize that the catalysts used in the

hydrocracking / hydrodemetallization process of Inomata would eventually have to be removed and replaced with fresh catalyst. Moreover, the use of fluidized units for hydrocracking and hydrodemetallization (and which Audeh specifically discloses (see Audeh, column 4, lines 26-35)) are commonly known in the art to provide for the removal and/or regeneration of spent catalyst particles used therein (see e.g., J. Reese et al., *Industrial Applications of Three-Phase Fluidization Systems*, in FLUIDIZATION, SOLIDS HANDLING, AND PROCESSING, Noyes Publications (Westwood, New Jersey 1998) at pages 615-616, and Fig. 6 (showing used catalyst outlet port)).

16. With respect to claim 5, Audeh discloses a process for upgrading crude oil from a subterranean reservoir of heavy oil or bitumen, comprising: (a) converting asphaltenes to steam for use in producing heavy oil or bitumen from a reservoir (see Audeh, column 5, lines 64-68; and column 6, lines 1-3); (b) solvent deasphalting at least a portion of the heavy oil or bitumen to form an asphaltene fraction and a deasphalted oil (DAO) fraction essentially free of asphaltenes having a reduced metals content (see Audeh, column 9, lines 15-38); (c) supplying the asphaltenes fraction from the solvent deasphalting to the asphaltenes conversion (see Audeh, column 5, lines 35-37 and 64-66; and drawing); (d) supplying a feed comprising the DAO fraction to an upgrading means (see Audeh, column 5, lines 42-63); (e) recovering an upgraded product (see Audeh, column 5, lines 55-59).

Audeh does not disclose wherein the upgrading means involves depositing a

portion of the metals from the DAO fraction onto an FCC catalyst, recovering a hydrocarbon effluent having a reduced metal content from an FCC unit, or removing metallized FCC catalyst from the FCC unit.

However, Audeh discloses that his process can be used to produce a FCC feed (see Audeh, column 4, lines 32-35), and that the upgrading means may be catalytic cracking, hydrotreating, or hydrocracking (see Audeh, column 5, lines 59-61). In addition, Inomata discloses a process for the solvent extraction and hydrorefining of heavy oil (see Inomata (English translation), Abstract). In the first stage of Inomata's process, asphalthenic components are selectively removed from a heavy oil feed by solvent extraction (see Inomata (English translation) at page 6, lines 20-24). Next, the deasphalted oil is recovered and subjected to hydrorefining, which Inomata describes as encompassing both hydrocracking and hydrodemtallization (see Inomata (English translation) at page 7, lines 21-29). Elaborating on the process of hydrodemetallization, Inamato explains that metallic compounds in the hydrocarbon are hydrolyzed at high temperatures and pressures in the presence of hydrogen wherein the elemental metal contaminants are precipitated onto the catalyst to obtain a refined oil having a low metal concentration (see Inomata (English translation) at page 7, lines 32-34). Inomata further discloses that two are more catalyst types can be used together in the hydrorefining stage, such that it is possible to carry out hydrocracking and hydrodemetallization in the same unit (see Inomata (English translation) at page 7, lines 44-48). Examiner notes that neither Audeh nor Inomata expressly disclose removing metallized FCC catalyst from the FCC unit. However, Inomata explains that the

hydrorefining process is a "representative refining process," and that metal contaminants contained within the DAO precipitate out onto the catalysts used during hydrodemetallization. Thus, the person having ordinary skill in the art of heavy oil upgrading and FCC processes would recognize that the catalysts used in the hydrocracking / hydrodemetallization process of Inomata would eventually have to be removed and replaced with fresh catalyst. Moreover, the use of fluidized units for hydrocracking and hydrodemetallization (and which Audeh specifically discloses (see Audeh, column 4, lines 26-35)) are commonly known in the art to provide for the removal and/or regeneration of spent catalyst particles used therein (see e.g., J. Reese et al., *Industrial Applications of Three-Phase Fluidization Systems*, in FLUIDIZATION, SOLIDS HANDLING, AND PROCESSING, Noyes Publications (Westwood, New Jersey 1998) at pages 615-616, and Fig. 6 (showing used catalyst outlet port)).

Therefore, the person having ordinary skill in the art of heavy oil upgrading would have been motivated to incorporate the use of Inomata's hydrorefining process as the "upgrading means" of Audeh's process in order to (1) deposit a portion of the metals from the DAO fraction onto an FCC catalyst, (2) recover a hydrocarbon effluent having a reduced metal content from an FCC unit, and (3) remove metallized FCC catalyst from the FCC unit.

Finally, the person having ordinary skill in the art of heavy oil upgrading would have had a reasonable expectation of success in incorporating the use of Inomata's hydrorefining process as the upgrading means of Audeh's process because (1) both Audeh and Inomata are directed to the solvent deasphalting of heavy oil, and (2) Audeh

specifically contemplates the use of hydrocracking and hydrotreating as the "upgrading means" in a process for upgrading crude oils.

17. With respect to claims 6-8, Audeh discloses wherein the asphalt fraction from a solvent deasphalting process is burned to produce steam which is then injected into the ground to produce more heavy oil (see Audeh, column 5, lines 64-68; and column 6, line 1).

18. With respect to claim 10, Inomata discloses wherein the solvent deasphalting provides high lift (see Inomata (English translation) at page 12, Table 1).

19. With respect to claim 11, Audeh discloses feeding a portion of the asphaltenes fraction to a delayed coker unit to produce coker liquids and coke (see Audeh, column 10, lines 51-54).

20. With respect to claim 12, Audeh discloses wherein lower boiling hydrocarbon fractions are introduced to an upgrading means with the DAO fraction (see Audeh, column 5, lines 42-61).

21. With respect to claim 13, Inomata discloses wherein the hydrorefining unit is operated at a conversion from 30 to 65 percent by volume of the feed to the hydrorefining unit (see Inomata (English translation) at page 14, lines 42-46; and page 15, lines 5-25).

22. With respect to claim 14, Inomata discloses wherein operating conditions in the hydrorefining unit are adjusted to control proportions of individual components obtained in the hydrorefining effluent (see Inomata (English translation) at Table 6 and accompanying text).

23. With respect to claim 15, Inomata discloses hydrotreating the hydrocarbon effluent from the hydrorefining unit to produce a low sulfur hydrocarbon effluent (see Inomata (English translation) at page 7, lines 31-32).

24. With respect to claim 16, Inomata discloses wherein the hydrotreating is effected at a moderate pressure of from 3.5 to 10 MPa (see Inomata (English translation) at page 13, line 11).

25. With respect to claim 27, Audeh discloses an apparatus for upgrading crude oil from a subterranean reservoir of heavy oil or bitumen, comprising: (a) means for converting asphaltenes to steam (50) for use in producing heavy oil or bitumen from a reservoir; (b) means for solvent deasphalting (20) at least a portion of the produced heavy oil or bitumen containing metals to form an asphaltene fraction and a deasphalted oil (DAO) fraction essentially free of asphaltenes having a reduced metals content; (c) means for supplying the asphaltene fraction from the solvent deasphalting to the asphaltenes conversion (26); (d) means for supplying a feed comprising the DAO fraction to an upgrading means (42); (e) means for recovering an upgraded hydrocarbon effluent from an upgrading means (60).

Audeh does not disclose wherein the upgrading means comprises a reaction zone for depositing metals from the DAO fraction onto an FCC catalyst, means for recovering a hydrocarbon effluent having a reduced metal content from an FCC unit, or means for removing metallized FCC catalyst from the FCC unit.

However, Audeh discloses that his process can be used to produce a FCC feed (see Audeh, column 4, lines 32-35), and that the upgrading means may be catalytic

cracking, hydrotreating, or hydrocracking (see Audeh, column 5, lines 59-61). In addition, Inomata discloses a process for the solvent extraction and hydrorefining of heavy oil (see Inomata (English translation), Abstract). In the first stage of Inomata's process, asphalthenic components are selectively removed from a heavy oil feed by solvent extraction (see Inomata (English translation) at page 6, lines 20-24). Next, the deasphalted oil is recovered and subjected to hydrorefining, which Inomata describes as encompassing both hydrocracking and hydrodemtallization (see Inomata (English translation) at page 7, lines 21-29). Elaborating on the process of hydrodemetallization, Inamato explains that metallic compounds in the hydrocarbon are hydrolyzed at high temperatures and pressures in the presence of hydrogen wherein the elemental metal contaminants are precipitated onto the catalyst to obtain a refined oil having a low metal concentration (see Inomata (English translation) at page 7, lines 32-34). Inomata further discloses that two are more catalyst types can be used together in the hydrorefining stage, such that it is possible to carry out hydrocracking and hydrodemetallization in the same unit (see Inomata (English translation) at page 7, lines 44-48). Examiner notes that neither Audeh nor Inomata expressly disclose removing metallized FCC catalyst from the FCC unit. However, Inomata explains that the hydrorefining process is a "representative refining process," and that metal contaminants contained within the DAO precipitate out onto the catalysts used during hydrodemetallization. Thus, the person having ordinary skill in the art of heavy oil upgrading and FCC processes would recognize that the catalysts used in the hydrocracking / hydrodemetallization process of Inomata would eventually have to be

removed and replaced with fresh catalyst. Moreover, the use of fluidized units for hydrocracking and hydrodemetallization (and which Audeh specifically discloses (see Audeh, column 4, lines 26-35)) are commonly known in the art to provide for the removal and/or regeneration of spent catalyst particles used therein (see e.g., J. Reese et al., *Industrial Applications of Three-Phase Fluidization Systems*, in FLUIDIZATION, SOLIDS HANDLING, AND PROCESSING, Noyes Publications (Westwood, New Jersey 1998) at pages 615-616, and Fig. 6 (showing used catalyst outlet port)).

Therefore, the person having ordinary skill in the art of heavy oil upgrading would have been motivated to incorporate the use of Inomata's hydrorefining process as the "upgrading means" of Audeh's process in order to provide (1) a reaction zone for depositing a portion of the metals from the DAO fraction onto an FCC catalyst, (2) means for recovering a hydrocarbon effluent having a reduced metal content from an FCC unit, and (3) means for removing metallized FCC catalyst from the FCC unit.

Finally, the person having ordinary skill in the art of heavy oil upgrading would have had a reasonable expectation of success in incorporating the use of Inomata's hydrorefining means as the upgrading means of Audeh's apparatus because (1) both Audeh and Inomata are directed to the solvent deasphalting of heavy oil, and (2) Audeh specifically contemplates the use of hydrocracking and hydrotreating as the "upgrading means" in an apparatus for upgrading crude oils.

26. With respect to claims 28-30, Audeh discloses converting the asphaltenes to steam for use in producing heavy oil or bitumen from the reservoir for feed to the solvent deasphalting (see Audeh, column 5, lines 64-68; and column 6, lines 1-3).

27. With respect to claim 31, Inomata discloses wherein the solvent deasphalting means provides for high lift (see Inomata (English translation) at page 12, Table 1).

28. With respect to claim 32, Audeh discloses feeding a portion of the asphaltenes fraction to a delayed coker unit to produce coker liquids and coke (see Audeh, column 10, lines 51-54).

29. With respect to claim 33, Inomata discloses wherein the hydrorefining unit is operated at a conversion from 30 to 65 percent by volume of the feed to the hydrorefining unit (see Inomata (English translation) at page 14, lines 42-46; and page 15, lines 5-25).

30. With respect to claim 34, Inomata discloses wherein operating conditions in the hydrorefining unit are adjusted to control proportions of individual components obtained in the hydrorefining effluent (see Inomata (English translation) at Table 6 and accompanying text).

31. With respect to claim 35, Inomata discloses hydrotreating the hydrocarbon effluent from the hydrorefining unit to produce a low sulfur hydrocarbon effluent (see Inomata (English translation) at page 7, lines 31-32).

32. With respect to claim 36, Inomata discloses wherein the hydrotreating is effected at a moderate pressure of from 3.5 to 10 MPa (see Inomata (English translation) at page 13, line 11).

33. Claims 9, 17, and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Audeh (US 5192421) in view of Inomata (JP 2002-302680) and Wallace (P.S. Wallace et al., *Heavy Oil Upgrading by the Separation and Gasification of Asphaltenes*,

Gasification Technologies Conference (San Francisco 1998), *available at* http://www.gasification.org/Docs/1998_Papers/gtc9817p.pdf).

34. With respect to claim 9, Audeh discloses a process for upgrading crude oil from a subterranean reservoir of heavy oil or bitumen, comprising: (a) converting asphaltenes to steam for use in producing heavy oil or bitumen from a reservoir (see Audeh, column 5, lines 64-68; and column 6, lines 1-3); (b) solvent deasphalting at least a portion of the heavy oil or bitumen to form an asphaltene fraction and a deasphalted oil (DAO) fraction essentially free of asphaltenes having a reduced metals content (see Audeh, column 9, lines 15-38); (c) supplying the asphaltenes fraction from the solvent deasphalting to the asphaltenes conversion (see Audeh, column 5, lines 35-37 and 64-66; and drawing); (d) supplying a feed comprising the DAO fraction to an upgrading means (see Audeh, column 5, lines 42-63); (e) recovering an upgraded product (see Audeh, column 5, lines 55-59); and (f) producing heavy oil or bitumen from the reservoir for feed to the solvent deasphalting (see Audeh, column 5, lines 64-68; and column 6, lines 1-3).

Audeh does not disclose wherein the upgrading means involves depositing a portion of the metals from the DAO fraction onto an FCC catalyst, recovering a hydrocarbon effluent having a reduced metal content from an FCC unit, or removing metallized FCC catalyst from the FCC unit; or wherein the asphaltenes conversion comprises gasification of a portion of the asphaltenes fraction to provide power, steam, or fuel gas for the mining and extraction.

However, Audeh discloses that his process can be used to produce a FCC feed (see Audeh, column 4, lines 32-35), and that the upgrading means may be catalytic

cracking, hydrotreating, or hydrocracking (see Audeh, column 5, lines 59-61). In addition, Inomata discloses a process for the solvent extraction and hydrorefining of heavy oil (see Inomata (English translation), Abstract). In the first stage of Inomata's process, asphalthenic components are selectively removed from a heavy oil feed by solvent extraction (see Inomata (English translation) at page 6, lines 20-24). Next, the deasphalted oil is recovered and subjected to hydrorefining, which Inomata describes as encompassing both hydrocracking and hydrodemtallization (see Inomata (English translation) at page 7, lines 21-29). Elaborating on the process of hydrodemetallization, Inamato explains that metallic compounds in the hydrocarbon are hydrolyzed at high temperatures and pressures in the presence of hydrogen wherein the elemental metal contaminants are precipitated onto the catalyst to obtain a refined oil having a low metal concentration (see Inomata (English translation) at page 7, lines 32-34). Inomata further discloses that two are more catalyst types can be used together in the hydrorefining stage, such that it is possible to carry out hydrocracking and hydrodemetallization in the same unit (see Inomata (English translation) at page 7, lines 44-48). Examiner notes that neither Audeh nor Inomata expressly disclose removing metallized FCC catalyst from the FCC unit. However, Inomata explains that the hydrorefining process is a "representative refining process," and that metal contaminants contained within the DAO precipitate out onto the catalysts used during hydrodemetallization. Thus, the person having ordinary skill in the art of heavy oil upgrading and FCC processes would recognize that the catalysts used in the hydrocracking / hydrodemetallization process of Inomata would eventually have to be

removed and replaced with fresh catalyst. Moreover, the use of fluidized units for hydrocracking and hydrodemetallization (and which Audeh specifically discloses (see Audeh, column 4, lines 26-35)) are commonly known in the art to provide for the removal and/or regeneration of spent catalyst particles used therein (see e.g., J. Reese et al., *Industrial Applications of Three-Phase Fluidization Systems*, in FLUIDIZATION, SOLIDS HANDLING, AND PROCESSING, Noyes Publications (Westwood, New Jersey 1998) at pages 615-616, and Fig. 6 (showing used catalyst outlet port)). Finally, Wallace discloses an integrated deasphalting-gasification process whereby the asphalt fraction obtained in a deasphalting process is used as feed to an asphalt gasification process (see Wallace, pages 5-6). Wallace explains that the combined deasphalting-gasifying process can beneficially be used in oil fields to produce syngas for meeting the power requirements of the deasphalter, gasifier, and associated oil production facilities (see Wallace, pages 10-11).

Therefore, the person having ordinary skill in the art of heavy oil upgrading would have been motivated to (1) incorporate the use of Inomata's hydrorefining process as the "upgrading means" of Audeh's process in order to (a) deposit a portion of the metals from the DAO fraction onto an FCC catalyst, (b) recover a hydrocarbon effluent having a reduced metal content from an FCC unit, and (c) remove metallized FCC catalyst from the FCC unit; and (2) incorporate use of an asphalt gasifier (as taught by Wallace) in order to produce syngas for use as fuel to meet the power requirements of the mining and extraction operations.

Finally, the person having ordinary skill in the art of heavy oil upgrading would have had a reasonable expectation of success in incorporating the use of Inomata's hydrorefining process and Wallace's asphalt gasification process as additions to Audeh's process for upgrading heavy oils because (1) Audeh, Inomata, and Wallace are all directed to the solvent deasphalting of heavy oil, (2) Audeh specifically contemplates the use of hydrocracking and hydrotreating as the "upgrading means" in a process for upgrading crude oils, and (3) Wallace explicitly discloses the use of his asphalt gasification process as part of a combined deasphalting-gasification process.

35. With respect to claims 17 and 37, Wallace discloses gasifying asphaltenes recovered in the asphaltenes fraction from the solvent deasphalting to produce hydrogen for the hydrotreating (see Wallace, pages 6-7).

Conclusion

36. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Randy Boyer whose telephone number is (571) 272-7113. The examiner can normally be reached Monday through Friday from 8:00 A.M. to 5:00 P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola, can be reached at (571) 272-1444. The fax number for the organization where this application or proceeding is assigned is 571-273-8300.

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